

# UCD MSc Business Analytics

## Capstone Project:

### Predicting Transactions Times

#### Iteration 2 - Data Understanding

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Document purpose: This is a working document intended to capture our understanding of the available data. This will eventually form part of the final project report.

Latest dataset: Dataset from Cosmic launch (6th Feb) to End March. Pulled on 20/4/17 and provided to us on 26/4/17.

Filename: UCD\_Data\_20170420\_1.xlsx

To predict the processing times for cases, we have been provided with historic data. The dataset that we are working from was extracted from the newly implemented COSMIC records logging system. The data is in the form of an excel workbook with 4 data sheets along with some additional sheets which include how the data was obtained – ie. what query was used.

1. vw\_Incident – 13018 items
2. vw\_HoldActivity – 9104 items
3. vw\_AuditHistory – 16148 items
4. vw\_PackageTriageEntry – 9075 items

Every case includes a different number of transactions but we are only interested in the time to process a case. The incident worksheet contains a list of cases. HoldActivity, AuditHistory and PackageTriageEntry contain transaction level details. The PackageTriageEntry form has been disabled and will not be available in the future unless we determine that there is value in requesting it.

There is a seasonality aspect to the data – iteration 3.

Merging and prediction transaction level details will be in iteration 3.

The following tables lay out the variables in each sheet, their significance, our pre-processing decision and the reasoning. The decisions at this point will be reviewed at each iteration and could be changed. Note that red means that variable needs extra work.

The decisions were implemented in a pre-processing program and a cleaned dataset was created. Modelling was then trialled on the incident data. See modelling document.

Worksheet	Variable Name	Variable Use	Pre-Processing	Reasoning
Incident	TicketNumber	Identification of case	Keep as is	Need for case ID
Incident	IncidentId	System identifier for the case	Delete column	Use TicketNumber for ID
Incident	Created_On	Created in COSMIC by BPO team	Use to calculate time taken – then delete	Needed for time taken only
Incident	Receiveddate	Operations Centre received the pack	Delete column	Manual entry – not reliable. Using other fields for time
Incident	ResolvedDate	Date the case was resolved	Use to calculate time taken – then delete	Needed for time taken only
Incident	Queue	The location of case at time of pulling data	Combine types, One hot encoding	Too many options for direct one hot
Incident	StatusReason	Outcome of case	Filter out "Rejected", One hot	Not interested in rejected
Incident	Priority		Mapping	Ordinal variable
Incident	ValidCase		Filter by 1, Delete column (min_variable_types function will clear this)	Only interested in 1 entries
Incident	BusinessFunction		Delete column (min_variable_types, function will clear this)	Only 1 variable type
Incident	LineOfBusiness		Delete column (min_variable_types, function will clear this)	Only 1 variable type
Incident	Program		Filter by "Enterprise", Delete column (min_variable_types function will clear this)	Only want "Enterprise" entries
Incident	CaseType		Delete column (min_variable_types, function will clear this)	Only 1 variable type
Incident	CaseSubTypes		Delete column (min_variable_types, function will clear this)	Only 1 variable type
Incident	Reason		Delete column (min_variable_types, function will clear this)	Only 1 variable type
Incident	SubReason		One hot	

Incident	SubSubReason		Delete column (min_entries function will clear this)	No entries present
Incident	CountrySource	Where did case come from	Combine types, One hot encoding	Important but need to place in buckets
Incident	CountryProcessed	Where is case being processed	Combine types, One hot encoding	Important but need to place in buckets
Incident	SalesLocation	Where is sale being made to	Combine types, One hot encoding	Important but need to place in buckets
Incident	ROCName	Regional operating centre name	One hot encoding	
Incident	CaseRevenue		Keep as is but normalise	Do not know what this does
Incident	CurrencyName		Delete column	We have all in USD, can delete others
Incident	IsoCurrencyCode		Delete column	We have all in USD, can delete others
Incident	RevenueImpactAmount		Delete column	Mostly NULL entries
Incident	IsGovernment		Keep as is	
Incident	IsAudited		Keep as is	Mostly 0 entries
Incident	Language		Delete column, (min_variable_types function will clear this)	Only 1 variable type (after filtering)
Incident	LanguageName		Filter by "English", Delete column (min_variable_types function will clear this)	Only want "English" entries
Incident	sourcesystem		One hot encoding	
Incident	caseOriginCode		Delete column	Do not know what this does
Incident	Source		One hot encoding	
Incident	pendingemails		Delete column	Mostly 0 entries
Incident	RelatedCases		Delete column	Don't know how else to include this
Incident	Auditresult		Delete column	Mostly 0 entries
Incident	PendingRevenue		Delete column	Mostly 0 entries
Incident	Requestsperscase		Delete column	Mostly 1 entries
Incident	Totalbillabletime		Delete column	Mostly 0 entries

Incident	Totaltime		Delete column	Mostly 0 entries
Incident	CreditAmount		Delete column	Mostly NULL entries
Incident	DebitAmount		Delete column	Mostly NULL entries
Incident	OrderAmount		Delete column	Not enough entries
Incident	InvoiceAmount		Delete column	Mostly NULL entries
Incident	Deleted		Delete column	No entries
Incident	TotalIdleTime		Delete column	Not useful
Incident	TotalWaitTime		Delete column	Not useful
Incident	WorkbenchGroup		Delete column	Do not know what this does
Incident	Workbench		Delete for now (then One hot in groups)	Do not know what this does
Incident	RejectionReason		Delete column	Mostly NULL entries
Incident	RejectionSubReason		Delete column	Mostly NULL entries
Incident	PackageNumber		Delete column	Mostly NULL entries
Incident	RequiredThreshold		Delete column	Mostly 0 entries
Incident	Slipped		Delete column	Mostly 0 entries
Incident	DefectiveCase		Delete column	Mostly 0 entries
Incident	OLSRevenue		Keep as is	
Incident	Revenutype		One hot encoding	
Incident	ProcessName		Delete column	Only 1 variable type
Incident	StageName		One hot encoding (map next time)	Ordinal variable
Incident	AmountinUSD		Keep as is, but normalise	Important variable
Incident	IsMagnumCase		Keep as is	
Incident	IsSignature		Keep as is	
Incident	Complexity		Mapping	Ordinal variable
Incident	Numberofreactivations		Delete column	not enough entries
Incident	NumberofChildIncidents		Delete column	Mostly NULL entries
Incident	ParentCase		Delete column	Mostly NULL entries
Incident	Referencesystem		Delete column	Not enough entries
Incident	StateCode		Delete column	Only 1 variable type

Incident	Isrevenueimpacting		Delete column	Mostly 0 entries
Incident	IsSOXCase	Binary: A legal document requirement	Keep, fill NULLS with 0s	Important variable. Assume 0 or Null means not SOX

Worksheet	Variable Use	Variable Name	Pre-Processing	Reasoning
HoldActivity	Links to case ID	TicketNumber	Keep as is	Need for case ID
HoldActivity	System ID	ActivityId	Delete column	Use TicketNumber for ID
HoldActivity		RegardingObjectId	Keep as is	Need for ID
HoldActivity		HoldDuration	Keep as is	
HoldActivity		Statuscode	Filter by "Completed", Delete column	Only interested in completed
HoldActivity		Statecode	Delete column	Duplicate of Statuscode
HoldActivity		TimeZoneRuleVersionNumber	Keep as is	
HoldActivity		HoldTypeName	Filter out "Internal", one hot	Not interested in Internal
HoldActivity		Reason	One hot encoding	
HoldActivity		AssignedToGroup	One hot encoding	
HoldActivity		StartTime	Calculate time, delete	
HoldActivity		EndTime	Calculate time, delete	
HoldActivity		IsThreeStrikeRule	Delete column	Only 1 variable type
HoldActivity		HoldSubReason	Delete column	Mostly nulls
HoldActivity		Modified_On	Delete column	Use HoldDuration for time
HoldActivity		Deleted	Delete column	No entries

Worksheet	Variable Use	Variable Name	Pre-Processing	Reasoning
AuditHistory	Links to case ID	TicketNumber	Keep as is	Need for case ID
AuditHistory	System ID	AuditHistoryId	Delete column	Use TicketNumber for ID
AuditHistory		AuditId	Keep as is	Need for ID
AuditHistory		EntityId	Keep as is	Need for ID
AuditHistory		EntityLogicalName	Delete column (min_variable_types function will clear this)	Only 1 variable type
AuditHistory		CaseId	Keep as is	Need for ID
AuditHistory		NewValue	Combine (NewValue, OldValue, Action)	Movement through system
AuditHistory		OldValue	Combine (NewValue, OldValue, Action)	
AuditHistory		Action	Combine (NewValue, OldValue, Action)	
AuditHistory		Attribute	Delete column (min_variable_types function will clear this)	Only 1 variable type
AuditHistory		TimeStamp	Delete column	Use Created_on
AuditHistory		Deleted	Delete column (min_entries function will clear this)	No entries
AuditHistory		TenantId	Delete column (min_variable_types function will clear this)	Only 1 variable type
AuditHistory		VersionNumber	Delete column (min_variable_types function will clear this)	Only 1 variable type
AuditHistory		StateCode	Delete column (min_variable_types function will clear this)	Only 1 variable type
AuditHistory		Status	Delete column (min_variable_types function will clear this)	Only 1 variable type
AuditHistory		StatusCode	Delete column (min_variable_types function will clear this)	Only 1 variable type
AuditHistory		StatusReason	Delete column (min_variable_types function will clear this)	Only 1 variable type
AuditHistory		UTCConversionTimeZoneCode	Keep as is	
AuditHistory		Created_On	Use for time, Delete column	
AuditHistory		Modified_On	Use for time, Delete column	
AuditHistory		ImportSequenceNumber	Delete column (min_entries function will clear this)	No entries
AuditHistory		OverriddenCreatedOn	Delete column (min_entries function will clear this)	No entries

Worksheet	Variable Use	Variable Name	Pre-Processing	Reasoning
PackageTriageEntry	Links to case ID	TicketNumber	Keep as is	Need for case ID
PackageTriageEntry	System ID	PackageTriageEntryId	Delete column	Use TicketNumber for ID
PackageTriageEntry		EntryType	One hot encoding	
PackageTriageEntry		EntryLevel	One hot encoding	
PackageTriageEntry		EntryProcess	One hot encoding	
PackageTriageEntry		PCNStatus	Delete column	Mostly 0s
PackageTriageEntry		SAPStatus	Delete column	Mostly 0s
PackageTriageEntry		PackageTriageFormId	Keep as is	Need for ID
PackageTriageEntry		StateCode	Delete column	Only 1 variable type
PackageTriageEntry		StatusCode	Delete column	Only 1 variable type
PackageTriageEntry		Created_On	Use for time, Delete column	
PackageTriageEntry		Modified_On	Use for time, Delete column	